Am ndments to th Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application. No claims have been amended. Claims 1-3 and 41-42 have been canceled without prejudice.

1-3. (Canceled)

4. (Original) An apparatus, comprising:

an optical waveguide having a core, a cladding, and an interaction region;

two or more reflectors aligned to facilitate multiple passes of a band of wavelengths within an optical signal through the interaction region, the two or more reflectors including a first reflector and a second reflector;

an acoustic wave exciter affixed to the interaction region; and

light-absorbing material interposed between the first reflector and the second reflector.

5. (Original) The apparatus of claim 4, wherein the acoustic wave exciter includes an acoustic wave propagation member, a signal generator, and an acoustic wave generator.

6. (Original) The apparatus of claim 5, wherein the acoustic wave propagation member comprises an acoustic horn.

7. (Original) The apparatus of claim 5, wherein the acoustic wave generator comprises a transducer.

8. (Original) The apparatus of claim 4, wherein the first reflector comprises a Fiber Bragg Grating with a reflectivity of less than one hundred percent.

9. (Original) The apparatus of claim 4, wherein the first reflector comprises a mirror with a reflectivity of less than one hundred percent.

10. (Original) The apparatus of claim 4, wherein the first reflector comprises a recirculator with a reflectivity of less than one hundred percent.

11. (Original) The apparatus of claim 4, wherein the first reflector comprises a coupler with a reflectivity of less than one hundred percent.

12. (Original) The apparatus of claim 4, wherein the two or more reflectors are aligned to reflect the optical signal bi-directionally through the interaction region.

13. (Original) The apparatus of claim 4, wherein the interaction region has a first portion and a second portion, the length of the first portion is based upon an optical wavelength in the optical signal, frequency of the acoustic wave, and type of the fiber.

14. (Original) The apparatus of claim 4, wherein the optical wave-guide comprises a single mode optical fiber.

15. (Original) The apparatus of claim 4, wherein the apparatus comprises an acoustical-optical tunable bandpass filter.

16. (Original) The apparatus of claim 15, wherein a transmission spectrum of the acoustical-optical tunable bandpass filter is less than 18 Gigahertz.

17. (Original) The apparatus of claim 4, wherein the acoustic wave exciter is tunable to select a center optical wavelength in the optical signal.

18. (Original) The apparatus of claim 4, wherein the two or more reflectors further include a third reflector and a fourth reflector aligned to facilitate multiple passes of the optical signal through the interaction region in a unidirectional manner.

19. (Original) The apparatus of claim 8, further comprising:

an acoustic wave absorber affixed to the interaction region.

20. (Original) The apparatus of claim 4, wherein the light absorbing material includes a fiber Bragg grating aligned to reflect selected wavelengths at an angle out of the optical waveguide.

21. (Original) A method, comprising:

receiving an optical signal;

transmitting an acoustic wave at a first frequency that corresponds to a first optical wavelength; the acoustic wave to cause a band of wavelengths within the optical signal to couple from a first mode to a second mode in an optical waveguide;

absorbing the energy of the optical signal in the first mode;

exposing the band of wavelengths in the second mode to the acoustic wave to cause the optical signal to couple from the second mode to the first mode; and

routing the band of wavelengths through the acoustic wave multiple times.

22. (Original) The method of claim 21, wherein the first optical wavelength is proportional to a second frequency applied by a signal generator to an acoustic wave generator.

23. (Original) The method of claim 21, wherein a percentage of the first optical wavelength coupled from the first mode to the second mode corresponds to a signal strength of the acoustic wave at the first frequency.

24. (Original) The method of claim 21, wherein the first mode comprises a core mode.

25. (Original) The method of claim 21, wherein the first mode comprises a cladding mode.

26. (Original) The method of claim 21, wherein the first mode comprises a polarization mode.

27. (Original) The method of claim 21, wherein coupling comprises transitioning energy from a first spatial propagation mode to a second spatial propagation mode.

28. (Original) The method of claim 21, wherein multiple times comprises three or more passes.

29. (Original) An optical monitoring device, comprising:

an optical signal input;

an acoustic wave exciter;

an optical waveguide having a core, a cladding, and an interaction region;

two or more reflectors aligned to facilitate multiple passes of a band of wavelengths within an optical signal through the interaction region, the two or more reflectors including a first reflector and a second reflector; and

light-absorbing material interposed between the first reflector and the second reflector.

30. (Original) The apparatus of claim 29, wherein the optical monitoring device comprises an optical power monitor.

31. (Original) The apparatus of claim 29, wherein the optical monitoring device comprises a spectral analyzer.

32. (Original) The apparatus of claim 29, wherein the optical waveguide further comprises a jacket surrounding the core and the cladding and the interaction region comprises a section of the optical waveguide where the jacket is removed.

33. (Original) A method, comprising:

receiving an optical signal in an optical waveguide; and

generating a set of acoustic waves at N number of frequencies which corresponds to N number of optical wavelengths; each acoustic wave in the set of acoustic waves having an amplitude that correlates to a reduction of optical power in the N number of optical wavelengths, the set of acoustic waves to cause a band of wavelengths within the optical signal to couple from a first mode to a second mode.

34. (Original) The method of claim 33, further comprising:

shaping a transmission spectrum by applying the set of acoustic waves to the optical waveguide.

35. (Original) The method of claim 34, further comprising:

synchronizing transmitting the set of waves to shape the transmission spectrum.

36. (Original) An apparatus, comprising:

an optical waveguide having a core, a cladding, and a first interaction region to allow coupling between optical modes in the optical waveguide; and

an acoustic wave exciter affixed to the first interaction region; the acoustic wave exciter to generate multiple band rejection responses that sweep a band pass of wavelengths across a wavelength spectrum to create a transmission spectrum.

37. (Original) The apparatus of claim 36, wherein the acoustic wave exciter comprises one or more acoustic wave exciters cascaded in series along the optical waveguide.

38. (Original) The apparatus of claim 37, wherein at least one of the one or more acoustic wave exciters is affixed to a second interaction region.

39. (Original) The apparatus of claim 36, wherein the apparatus comprises a band pass filter having a polarization dependence of less than two tenths of a decibel.

40. (Original) The apparatus of claim 36, further comprising:

a control component to synchronize the generation of the multiple band rejection responses to shape the transmission spectrum.

41-42. (Canceled)

43. (Original) An apparatus, comprising:

means for receiving an optical signal;

means for transmitting an acoustic wave at a first frequency that corresponds to a first optical wavelength; the acoustic wave to cause the optical signal to couple from a first mode to a second mode in an optical waveguide;

means for absorbing the energy of the optical signal in the first mode;

means for exposing the optical signal to the acoustic wave to cause the optical signal to couple from the second mode to the first mode; and

means for routing the optical signal through the acoustic wave multiple times.

44. (Original) The apparatus of claim 43, wherein the first mode comprises a core mode.

45. (Original) An apparatus, comprising:

means for receiving an optical signal in an optical waveguide; and

means for generating a set of acoustic waves at N number of frequencies which corresponds to N number of optical wavelengths; each acoustic wave in the set of acoustic waves having an amplitude that correlates to a reduction of optical power in the N number of optical wavelengths, the set of acoustic waves to cause the optical signal to couple from a first mode to a second mode.

46. (Original) The apparatus of claim 45, further comprising:

means for shaping a transmission spectrum by applying the set of acoustic waves to the optical waveguide.

REMARKS

Reconsideration of this application is respectfully requested. Claims 1, 2, and 41 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent number 5,781,268 by Lui et al. ("Lui"). Claims 1, 3, 41, and 42 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent number 5,263,037 by Trutna et al. ("Trutna"). Claims 33-40, 45, and 46 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S Patent No. 6,151,427 by Satorius ("Satorius") in view of U.S Patent No. 6,151,427 by Kim et al ("Kim"). Claims 4-32, 43, and 44 stand allowable.

No claims have been amended. Claims 1-3 and 41-42 have been canceled without prejudice.

The Examiner has rejected claims 1, 2, and 41 under 35 U.S.C. § 102(b) as being anticipated by Lui. The Examiner has rejected claims 1, 3, 41, and 42 under 35 U.S.C. § 102(b) as being anticipated by Trutna. Applicants cancel 1-3, 41, and 42 without prejudice.

The Examiner rejected claims 33-40, 45, and 46 under 35 U.S.C. § 103(a) as being unpatentable over Satorious in view of Kim. The Examiner States:

> Satorius does not specifically disclose [changing] amplitudes of the acoustic waves that correlate to a reduction of optical power in the wavelengths. Kim et al. discloses that the transmittance of an optical signal of a particular wavelength is a function of the amplitude of the acoustic waves (column 12, lines 13-37). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to vary the amplitudes of the set of acoustic waves to shape the transmission spectrum of the optical signals, since it was known in the art as shown by Kim et al. that the transmittance of an optical signal is a function of the amplitude of the applied acoustic wave. Thus the method of claims 33 and 34 would have been obvious for the same reason.

(Office Action page 4)

However, applicants respectfully assert that Satorius may not be properly combined 35 U.S.C. § 103(a) with Kim because the Satorius reference within itself distinguishes the Satorius invention away from the teachings of the Kim reference. The Satorius reference seven different times in the Background section distinguishes itself from the prior art by stating, "The present invention does not use a flexural acoustic wave to eliminate unwanted wavelengths." (See Satorius columns 1-3 and 6) Satorius, in fact, teaches using a <u>core mode blocker to eliminate the unwanted wavelengths</u> and the <u>acoustic waves to pass the desired wavelengths</u> in the target optical signal. Satorius discloses:

> The <u>core blocker blocks</u> any light in the core from travelling any further in the optic fiber and, essentially <u>eliminates this unwanted wavelength, or set of wavelengths</u>. (Col. 4, Lns. 28-32.)

(Emphasis Added)

Moreover, three of the prior art documents that Satorius specifically distinguishes its teachings from in the Background section are the works of Seok Hyun Yun and Byoung Yoon Kim. Dr. Yun is a co-inventor of the Kim reference, and Dr. Kim is the lead inventor of the Kim reference. Applicants attach a list the papers written by Dr. Kim and Dr. Yun distinguished by the language of the Satorius reference itself as appendix A. The Kim reference teaches the concept of varying the characteristics of a single acoustic wave applied to an optical fiber to eliminate unwanted wavelengths from an optical signal.

Satorius may not be combined with Kim for two reasons under 35 U.S.C. 103(a). First, the proposed modification cannot render Satorius, which emphasizes the use a core mode blocker to eliminate unwanted wavelengths unsatisfactory for its stated

purpose or change the principle operation of that reference. Satorius explicitly discloses:

> In the prior art, the flexural acoustic wave is used to remove unwanted frequencies and wavelengths from an optic signal by causing those wavelengths to enter the cladding and be absorbed by the buffer coating. In the present invention, a first flexural acoustic wave is used to select the wanted wavelengths. In the present invention, a core blocker 47 is used to eliminate unwanted wavelengths. (Col. 6, Lns. 35-41)

(Emphasis Added)

Thus, the purpose and the principle operation of Satorius would changed to allow Satorius to eliminate unwanted wavelengths in the proposed manner.

Second, Satorius may not be combined with Kim if Satorius teaches someone skilled in art after reading Satorius away from using the teachings of Kim. Satorius repeatedly teaches away from varying the characteristics of a single acoustic wave applied an optical fiber to eliminate unwanted wavelengths from an optical signal. Satorius also literally teaches away from using the teachings of Kim. It would be impermissible hindsight to combine Satorius with Kim based on applicants' own disclosure.

Further, even if Satorius and Kim were properly combinable under 35 U.S.C. 103(a), the combined references would not teach each and every limitation of the claim invention.

Independent claim 33 states:

> 33. A method, comprising:
> receiving an optical signal in an optical waveguide; and
> generating a set of acoustic waves at N number of frequencies which corresponds to N number of optical wavelengths; each acoustic wave in the set of acoustic waves having an amplitude that correlates to a reduction of optical power in the N number of optical wavelengths, the

set of acoustic waves to cause a band of wavelengths within the optical signal to couple from a first mode to a second mode.

(Emphasis Added)

As discussed above, Satorius does not disclose or suggest setting each acoustic wave in the set of acoustic waves to have an amplitude that correlates to a reduction of optical power in the N number of optical wavelengths. Kim also does not disclose or suggest setting each acoustic wave in the set of acoustic waves to have an amplitude that correlates to a reduction of optical power in the N number of optical wavelengths. Kim is completely silent about a set of acoustic waves and reducing optical power in N number of optical wavelengths that correlate to the amplitude of the set of acoustic waves.

Therefore, in view of the above distinction, neither Satorius, nor Kim, individually or in combination, disclose each and every limitation of claim 33. As such, claim 33 is not rendered obvious by Satorius in view of Kim under 35 U.S.C. § 103(a).

Given that claims 32-35 depend from and include the limitations of claim 33, applicants submit that claims 32-35 are not obvious under 35 U.S.C. § 103(a) in view of the Satorius and Kim.

Independent claim 36 states:

36. An apparatus, comprising:
an optical waveguide having a core, a cladding, and a first interaction region to allow coupling between optical modes in the optical waveguide; and
an acoustic wave exciter affixed to the first interaction region; the acoustic wave exciter to generate multiple band rejection responses that sweep a band pass of wavelengths across a wavelength spectrum to create a transmission spectrum.

(Emphasis Added)

As discussed above, Satorius does not disclose or suggest generating multiple band rejection responses to create a transmission spectrum. Kim also does not disclose or suggest generating multiple band rejection responses to create a transmission spectrum. Kim is completely silent about generating multiple band rejection responses to create a transmission spectrum.

Therefore, in view of the above distinction, neither Satorius, nor Kim, individually or in combination, disclose each and every limitation of claim 36. As such, claim 36 is not rendered obvious by Satorius in view of Kim under 35 U.S.C. § 103(a).

Given that claims 37-40 depend from and include the limitations of claim 36, applicants submit that claims 37-40 are not obvious under 35 U.S.C. § 103(a) in view of the Satorius and Kim.

Independent claim 36 states:

> 45. An apparatus, comprising:
> means for receiving an optical signal in an optical waveguide; and
> means for generating a set of acoustic waves at N number of frequencies which corresponds to N number of optical wavelengths; each acoustic wave in <u>the set of acoustic waves having an amplitude that correlates to a reduction of optical power in the N number of optical wavelengths, the set of acoustic waves to cause the optical signal to couple from a first mode to a second mode</u>.

(Emphasis Added)

As discussed above, Satorius does not disclose or suggest setting each acoustic wave in <u>the set of acoustic waves to have an amplitude that correlates to a reduction of optical power</u> in the N number of optical wavelengths to cause the optical signal to couple from a first mode to a second mode. Kim also does not disclose or suggest setting each acoustic wave in <u>the set of acoustic waves to have an amplitude that</u>

correlates to a reduction of optical power in the N number of optical wavelengths to cause the optical signal to couple from a first mode to a second mode.

Therefore, in view of the above distinction, neither Satorius, nor Kim, individually or in combination, disclose each and every limitation of claim 45. As such, claim 45 is not rendered obvious by Satorius in view of Kim under 35 U.S.C. § 103(a).

Given that claim 46 depends from and includes the limitations of claim 45, applicants submit that claim 46 is not obvious under 35 U.S.C. § 103(a) in view of the Satorius and Kim.

Conclusion

It is respectfully submitted that in view of the amendments and remarks set forth herein, the rejections and objections have been overcome. Applicant respectfully requests that a timely Notice of Allowance be issued in this case. Applicant reserves all rights with respect to the application of the doctrine equivalents. If there are any additional charges, please charge them to our Deposit Account No. 02-2666.

Respectfully submitted,
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Appendix A

Seok Hyun Yun et al., entitled "All-fiber tunable filter and laser based on two-mode fiber," published by the IEEE in Optics Letters, Jan. 1, 1996, Vol. 21, No. 1, pp. 27-29, full list of Authors S. H. Yun, I. K. Hwang, and B. Y. Kim.

Seok Hyun Yun et al., entitled "Suppression of polarization dependence in a two-mode-fiber acoustic-optic device," published by the IEEE in Optics Letters, Jun. 15, 1996, Vol. 21, No. 12, pp. 908-910, full list of Authors S. H. Yun, B. K. Kim, H. J. Jeong, and B. Y. Kim.

Hyo Sang Kim et al., entitled "All-fiber acousto-optic tunable notch filter with electronically controllable spectral profile," published by the IEEE in Optics Letters, Oct. 1, 1997, Vol. 22, No. 19, pp. 1476-1478, full list of Authors H. S. Kim, S. H. Yun, I. K. Hwang, and B. Y. Kim.